



Cost Allocation Workbook

**A Cost Allocation Model
for Louisiana Transit Operators**

July 1998 (Revised April 2003)



Cost Allocation Workbook

Prepared for

State of Louisiana
M. J. "Mike" Foster, Governor

Louisiana Department of Transportation and Development
Kam K. Movassaghi, Secretary

Public Transportation Section
Carol Cranshaw, Public Transportation Administrator

This project was originally funded through a contract for consulting services:
Technical Assistance for Rural Providers
State Project No. 741-99-0037, Federal Grant No. LA-18-X014 and LA-18-X015
Originally Prepared By Applied Technology Research Corporation
And Sub-Contractor Mary T. C. Johnson

Revised under State Project No. 741-99-0139, Federal Grant No. LA-18-X017
By Alliance Transportation Group, Inc.
And Sub-Contractor LKC Consulting Services, Inc.

July 1998 (Revised April 2003)

Preface

This manual is prepared as a condensed resource to assist Louisiana Transit System Managers in developing a cost allocation module for determining cost of current transit services and appropriate pricing for new services. The manual is presented in conjunction with a one-day workshop to provide practical experience in developing and applying an appropriate cost allocation model.

The procedures included in this manual are presented as a tool for allocating transit costs among programs and jurisdictions. While they are intended to be consistent with *Generally Accepted Accounting Principles (GAAP)* and other federal and state guidelines, they in no way constitute federal or state policy. Each agency is subject to the cost principles prescribed by the Office of Management and Budget appropriate for the type of organization (OMB Circular A-122—Cost Principles for Non-Profit Organizations or OMB Circular A-87—Cost Principles for State, Local, and Indian Tribal Governments).

Table of Contents

	Page
Introduction.....	1
Review of Accounting Terms and Concepts	2
Developing a Cost Allocation Model	5
Applying the Model	11
Case Study: Sunshine Transit	17
Appendix A. Case Study Answer Key.....	20
Bibliography	29

INTRODUCTION

This manual is presented as a companion document to a one-day workshop on developing and applying a cost allocation model for *Louisiana Transit* non-urbanized transportation providers. The purpose of the workshop is to provide a working tool for determining the cost of current transit operations and assist in the pricing of new services offered.

Objective: Our objective for developing and applying a cost allocation model is to ensure that total costs of transportation services are recovered and that they are recovered in an equitable manner (i.e. each program or jurisdiction pays its fair share).

Criteria: A cost allocation model should be:

- comprehensive—include all costs,
- consistent—over time and across programs,
- equitable—fair across programs and jurisdictions, and
- practical to apply—straightforward and explainable.

Based on the objective and criteria, a two-variable model consisting of vehicle hours and vehicle miles was adopted for use in this workshop. The framework for this model is recommended for use by all non-urbanized *Louisiana Transit* Operators.

There are several prerequisites to developing and applying a cost allocation module. These prerequisites include:

- complete documentation of all costs,
- full and appropriate allocation of all costs, and
- knowledge and understanding of how and why costs vary.

This manual addresses these prerequisites with a brief review of certain accounting terms and concepts. This review is provided as a standard framework for presenting the allocation model and to point out areas of consideration in your current accounting procedures.

Following this review the manual presents the process for developing a two-variable cost allocation module for a typical non-urbanized transit system. The model developed is then used to demonstrate the application of a cost allocation model to determine cost of current service, cost of incremental changes in service and pricing of new services. The final chapter provides a case study exercise to provide practice in the development and application of a cost allocation model.

For a more complete discussion on accounting concepts and on the selection and application of a cost allocation model refer to MTAP's *Comprehensive Financial Management Guidelines for Rural and Small Urban Public Transportation Providers*.

I. REVIEW OF ACCOUNTING TERMS AND CONCEPTS

The following review of accounting concepts is presented as a reminder of key considerations in assessing your current method of accounting. For a more detailed discussion of accounting concepts and procedures refer to MTAP's *Comprehensive Financial Management Guidelines for Rural and Small Urban Public Transportation Providers* (Chapter 4).

Full Cost Accounting—requires that all costs of providing transportation services are documented and appropriately allocated. Total costs include any commitment of or use of time, money, physical resources and other assets of the system used to provide passenger transportation services.

The two most forgotten costs of transportation that are often not accounted for by agencies are **depreciation** and **in-kind**. Documentation and allocation of both depreciation and in-kind expenses are required to determine the fully allocated cost of transportation. In addition, federal regulations require that comparative cost estimates in a competitive environment must include all cost including donated goods and services and depreciation.

In-kind—includes all volunteer and donated goods and services. In-kind or donated service are often quite substantial for many public transit agencies. Each in-kind good or service must be assigned a value based on what it would cost to purchase. Valuation methods are subject to appropriate federal and state requirements for acceptable costing procedures. **The value determined must also be included as non-cash revenue.**

All in-kind donations and their method of valuation must be documented. It is important that all volunteer time is documented in accordance with the same procedures utilized for paid workers.

Depreciation—is the decrease in the value of an asset over time. Depreciation expense is the annualized cost of capital—meaning that the cost of the asset is apportioned to each year in the useful life of the asset.

The most obvious depreciation expense for a transit system is the depreciation of vehicles. Vehicles and all other assets with a useful life of over one-year must be depreciated and documented using a recognized standard method of depreciation. Vehicles can be depreciated based on years of useful life or mileage incurred. Louisiana DOTD defines the minimum useful life of a vehicle as 5 years or 100,000 miles. Exhibit 1 illustrates the depreciation schedule for both alternatives using straight-line depreciation assuming a purchase price of \$30,000 with a estimated salvage value of \$6,000.

Exhibit 1. Straight-line Depreciation Schedule Alternatives

5 year useful life		100,00 miles useful life	
Year	Annual Depreciation Expense	Annual Vehicle Miles	Annual Depreciation Expense
1	4,800	14,250	3,420
2	4,800	32,000	7,680
3	4,800	30,125	7,230
4	4,800	23,625 *	5,670
5	4,800		
	\$ 24,000	100,000	\$ 24,000

*adjusted for minimum useful life of vehicle

It must be noted that funding agencies will treat depreciation expense differently. Some funding agencies do not reimburse for depreciation expenses (e.g. FTA Section 5311). Other agencies may only reimburse for local share of depreciation expense. For record keeping and reporting purposes you may be required to breakdown depreciation into federal share, local share, and donated share. **However, the total depreciation expense should be used in determining the fully allocated cost of transportation.**

Capital Costs vs. Operating Costs—all costs can be categorized as either capital cost or operating cost. Total cost will be the sum of all capital cost and all operating cost.

Capital Costs—expenses associated with long-term acquisition of physical assets that have a functional life extending over several years. Typical capital costs include vehicles, maintenance facilities, garages and other buildings. The annual cost of capital is accounted for as the annual depreciation expense for each asset.

Operating Costs—expenses, both direct and indirect, that are consumed in a single year. Total operating costs are typically broken into those costs involved in the actual provision of service (operating expense) and the costs involved in supportive services (administrative expense). Operating expenses include labor and fringe for drivers, dispatchers and mechanics; vehicle insurance; fuel; parts; maintenance cost; and other costs incurred in the actual provision of service. Administrative expenses may include administrative labor and fringe; office rent and utilities; general office supplies; non-vehicle insurance; professional services and other items used to support the transportation program.

Direct Costs vs. Indirect Costs—Total cost will be the sum of all direct costs and all indirect costs.

Direct Costs—expenses that **can** be associated on a one-to-one basis with a given service. Generally, most direct costs are variable costs. Examples of direct costs for transportation services include driver wages, vehicle insurance and vehicle maintenance costs.

Indirect Costs—expenses for goods and services that **cannot** be associated on a one-to-one basis with a specific program or function. These costs include the costs of general administrative support functions such as facility rent and administrative salaries.

Indirect costs are typically allocated based on an overhead rate. This overhead rate must be determined based on approved allocation procedures and it must be applied consistently. **Be careful**, items that contain an indirect cost component are often from expenses that contain both a direct and an indirect cost component. **An agency is required (with in reason) to break out any direct expenses from shared cost before allocating indirect cost using an overhead rate.** This usually requires a two step process.

For example: An agency rents total office space of is 3,500 sq. ft. at a rate of \$1,750/month (\$0.50/sq ft). The transportation section has a dedicated space of 200 sq. ft. and other programs are allocated a total of 2,800 sq. ft. The remaining 500 sq. ft. is allocated to general administrative support functions. The direct cost to transportation would be \$100 (200sq. ft. x \$0.50). The indirect cost rate would be the ratio of space dedicated to transportation to the amount of space dedicated to other programs (200/3000), or 6.7%. The transportation program's share of general administrative office space would be 6.7% of 500 or 34 sq.ft. Total rent allocations for transportation would be 234 sq. ft. (200+34) at a cost of \$117.00 per month.

Transportation would also be allocated 6.7% of other **building** related costs including building maintenance, janitorial services, utilities and insurance for the building. This rate **cannot** be applied to non-building related costs such as postage or telephone. The individual rates for each category of shared costs are determined separately using the same two-step process of allocating the appropriate direct and indirect costs.

Fixed Costs vs. Variable Costs—total costs will be equal to the sum of all fixed and variable costs.

Fixed Costs—costs that do not vary with the amount of service provided during a specified period of time, usually one year (e.g. facility and equipment depreciation, insurance, administrative salaries, and professional services)

Variable Costs—costs that change when the level of service provided changes (e.g. driver wages, fuel costs, and maintenance costs.)

Marginal Costs (Incremental Costs)—the additional cost of producing just one more (“marginal”) unit of output. Marginal cost can be expressed as a mathematical formula of change in cost divided by change in quantity.

Unit Costs—the average total cost of producing a specified number of outputs. Mathematically this can be expressed as total costs divided by number of outputs (in transit a typical output can be vehicle miles, vehicle hours or number of trips).

Allowable Costs—costs that can be charged to a government contract.

Reasonable Costs—a cost that does not exceed that which would be incurred by a prudent person under the circumstances prevailing at the time. The government considers the following when determining if the cost is reasonable:

1. Whether the cost is generally recognized as ordinary and necessary for the operation of the governmental unit or the performance of the contract
2. Must consider the restraints or requirements imposed by terms and conditions of contracts
3. Market prices for comparable goods or services
4. Individuals acting with prudence
5. Significant deviations from the established practices of the governmental unit

Allocation Variable—a measurable value that is known across all allocation categories

Cost Allocation—a tool that provides a way to distribute costs fairly and equitably that are reported together across services, programs or other areas where costs need to be defined.

II. DEVELOPING A COST ALLOCATION MODEL

The first step in developing a cost allocation model is determining unit costs and an overhead rate. These rates can be determined using the following steps:

1. **Assign fully allocated cost of transportation to standardized chart of accounts (exhibit 2).**

Exhibit 2 – Standardized Chart of Accounts

Expense Account	Total Cost
Vehicle Operations & Maintenance	
Labor	
Driver Salaries & Wages	\$ 70,308
Dispatcher Salaries & Wages	\$ 10,880
Mechanic Salaries & Wages	\$ 12,159
Fringe Benefits	
Driver Fringe	\$ 11,025
Dispatcher Fringe	\$ 1,808
Mechanic Fringe	\$ 2,359
Contract Maintenance Services	\$ 10,910
Materials & Supplies	
Fuel & Lubricants	\$ 17,019
Tires & Tubes	\$ 1,980
Other Parts & Supplies	\$ 4,185
Vehicle Licensing & Registration Fees	\$ 68
Purchased Transportation	\$ 26,139
Insurance - Passenger Revenue Vehicles	\$ 3,896
Leases & Rentals - Passenger Revenue Vehicles	
Lease or Rental Maintenance Facility	
General Administrative	
Labor	
Transportation Manager's Salary and Wages	\$ 7,759
Director's Salaries & Wages	\$ 2,328
Other Administrative Salaries & Wages	\$ 5,819
Fringe Benefits	
Transportation Manager's Fringe Benefits	\$ 1,164
Director's Fringe Benefits	\$ 349
Other Administrative Fringe Benefits	\$ 873
Professional & Technical Services	\$ 820
Materials & Supplies	\$ 3,811
Utilities	\$ 1,294
Insurance (other than passenger revenue vehicles)	\$ 13,474
Miscellaneous Expenses	
Dues & Subscriptions	\$ 19
Travel & Meetings	\$ 338
Leases & Rentals	
General Administrative Facilities	\$ 6,079
Other Expenses	
Depreciation - Passenger Revenue Vehicles	\$ 7,263
Depreciation - Maintenance Facility	
Depreciation - Buildings & Equipment	
Total Costs	\$ 224,126

2. **Assign Fixed and Variable Cost (exhibit 3) –**
 - a. Determine which costs are fixed and insert them into the fixed column.
 - b. Assuming the remaining costs are variable, determine what variable drives the cost (i.e. hours or miles) and assign the cost to that variable's column.
 - c. Total each of the columns

Exhibit 3 – Development of a Two Variable Cost Allocation Model

Expense Account	Total Cost	Variable Costs		Fixed Costs
		Vehicle Hours	Vehicle Miles	
Vehicle Operations & Maintenance				
Labor				
Driver Salaries & Wages	\$ 70,308	\$ 70,308		
Dispatcher Salaries & Wages	\$ 10,880			\$ 10,880
Mechanic Salaries & Wages	\$ 12,159		\$ 12,159	
Fringe Benefits				
Driver Fringe	\$ 11,025	\$ 11,025		
Dispatcher Fringe	\$ 1,808			\$ 1,808
Mechanic Fringe	\$ 2,359		\$ 2,359	
Contract Maintenance Services	\$ 10,910		\$ 10,910	
Materials & Supplies				
Fuel & Lubricants	\$ 17,019		\$ 17,019	
Tires & Tubes	\$ 1,980		\$ 1,980	
Other Parts & Supplies	\$ 4,185		\$ 4,185	
Vehicle Licensing & Registration Fees	\$ 68			\$ 68
Purchased Transportation	\$ 26,139		\$ 26,139	
Insurance - Passenger Revenue Vehicles	\$ 3,896		\$ 3,896	
Leases & Rentals - Passenger Revenue Vehicles				
Lease or Rental Maintenance Facility				
General Administrative				
Labor				
Transportation Manager's Salary and Wages	\$ 7,759			\$ 7,759
Director's Salaries & Wages	\$ 2,328			\$ 2,328
Other Administrative Salaries & Wages	\$ 5,819			\$ 5,819
Fringe Benefits				
Transportation Manager's Fringe Benefits	\$ 1,164			\$ 1,164
Director's Fringe Benefits	\$ 349			\$ 349
Other Administrative Fringe Benefits	\$ 873			\$ 873
Professional & Technical Services	\$ 820			\$ 820
Materials & Supplies	\$ 3,811			\$ 3,811
Utilities	\$ 1,294			\$ 1,294
Insurance (other than passenger revenue vehicles)	\$ 13,474			\$ 13,474
Miscellaneous Expenses				
Dues & Subscriptions	\$ 19			\$ 19
Travel & Meetings	\$ 338			\$ 338
Leases & Rentals				
General Administrative Facilities	\$ 6,079			\$ 6,079
Other Expenses				
Depreciation - Passenger Revenue Vehicles	\$ 7,263		\$ 7,263	
Depreciation - Maintenance Facility				
Depreciation - Buildings & Equipment				
Total Costs	\$ 224,126	\$ 81,333	\$ 85,910	\$ 56,883

3. Calculate the unit cost per hour and mile (exhibit 4).

Cost per hour = total cost assigned to vehicle hours / total number of vehicle hours

Cost per mile = total cost assigned to vehicle miles / total number of vehicle miles

The vehicle service level information (total number of vehicle hours and miles) should come from your daily vehicle logs and program tallies that are computed for your Section 5311 Monthly Trip Summary Report.

4. Calculate the overhead rate (exhibit 4)

Total variable cost = total cost for vehicle hours + total cost for vehicle miles

Overhead rate = total variable cost/total cost assigned to fixed cost

Add variable cost totals together (total costs assigned to vehicle miles + total costs assigned to vehicle hours)

Overhead rate = total variable costs / total fixed costs

Exhibit 4—Calculating unit costs and overhead rate

	Vehicle hours	Vehicle Miles	Fixed Costs
Total costs	\$ 81,333	\$ 85,910	\$ 56,883
Annual units of service	8,352	188,484	
Unit cost	\$9.74/per hour	\$0.46/ per mile	

5. Insert unit costs and overhead rate into cost allocation table or cost allocation formula.
(Exhibit 5)

Exhibit 5. Sample Two-Variable Cost Allocation Model

	Model Inputs		Model Variables	Model Outputs
	Operating Statistics		Unit Cost	Total Cost
Hours			\$ 9.74	\$ -
Miles			\$ 0.46	\$ -
				\$ - Variable Cost
Overhead Rate			34.01%	\$ - Fixed Cost
				\$ - Total Cost

Allocation Formula: Total Cost of Service =
 $1.3401 \times (\$9.74 \times \text{Hours} + \$0.46 \times \text{Miles})$

Exhibit 5. Sample Two-Variable Cost Allocation Model

	Model Inputs		Model Variables	Model Outputs
	Operating Statistics		Unit Cost	Total Cost
Hours	8,352		\$ 9.74	\$ 81,333.00
Miles	188,484		\$ 0.46	\$ 85,910.00
				\$167,243.00 Variable Cost
Overhead Rate			34.01%	\$ 56,883.00 Fixed Cost
				\$224,126.00 Total Cost

Allocation Formula: Total Cost of Service = \$224,128
 $1.3401 \times (\$9.74 \times 8,352 \text{ Hours} + \$0.46 \times 188,484 \text{ Miles})$

III. APPLYING THE MODEL

A. Determining Cost of Current Services—the cost allocation model can now be used to allocate total system transportation cost to the appropriate program or service. Assume our sample transit system provides transportation to two social service programs in addition to the non-program general public. Program A is operated as a shared service with the non-program cash fares. Program B is operated as dedicated service. The operating statistics for each program operated is provided in exhibit 6.

Exhibit 6. Sample Annual Operating Statistics by Program

	Total Transportation System	Program A	Program B	Non-Program Cash Fares
Transportation Costs	\$224,127			
Vehicle Hours	8,352		624	
Vehicle Miles	188,484		18,720	
Passenger Trips	39,642	19,821	7,928	11,893
Passenger Miles	339,535	106,803	69,966	162,766

Data Sources: Total Transportation Costs for the entire system comes from the total fully allocated cost of transportation as determined by your accounting system. The vehicle data comes from your Daily Vehicle Logs and the program tallies computed on your Section 5311 Monthly Trip Summary Report. Note that the vehicle hours and vehicle miles are not readily available by program for those programs that are operated as shared services. These values will be estimated using passenger miles as a basis for allocating actual service hours and miles between programs operated in the shared service.

First, take out dedicated service hours or miles from the system-wide totals (Exhibit 7a).

Exhibit 7a

	Hours	Miles
System wide	8,352	188,484
Dedicated service	624	18,720
Total shared service	7,728	169,764

Then, determine what percentage of passenger miles each program is generating and allocate the total shared service miles and hours by the calculated percentages (Exhibit 7b).

Exhibit 7b

Shared Services	Passenger Miles	% Psgr Miles for All Share Services	Shared Service Hours	Shared Service Miles
Program A	106,803	39.62%	3,062	67,260
Non Program	162,766	60.38%	4,666	102,504
Totals	269,569	100.00%	7,728	169,764

Now that the vehicle hours and miles have been properly allocated, the cost of each service can be calculated using the sample cost allocation model (exhibit 8).

Exhibit 8. Determining Cost of Current Services

Program A

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	3,061.83	\$9.7381	\$29,816.55
Miles	67,260	\$0.4558	\$30,657.11
			\$60,473.65 Variable Cost
Overhead Rate		34.01%	\$20,568.65 Fixed Cost
			\$81,042.31 Total Cost

Program B

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	624	\$9.7381	\$6,076.60
Miles	18,720	\$0.4558	\$8,532.58
			\$14,609.18 Variable Cost
Overhead Rate		34.01%	\$4,968.96 Fixed Cost
			\$19,578.14 Total Cost

Non-Program Service

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	4,666.17	\$9.7381	\$45,439.85
Miles	102,504	\$0.4558	\$46,721.32
			\$92,161.17 Variable Cost
Overhead Rate		34.01%	\$31,346.39 Fixed Cost
			\$ 123,507.56 Total Cost

B. Incremental Cost of Changes in Service—the first step in determining the incremental cost of change in service is to determine what model variables are affected by the change. By definition, fixed costs do not increase with normal increases in service. That leaves vehicle hours and vehicle miles.

An increase in service usually leads to a corresponding increase in both vehicle hours and vehicle miles. However, the increase to each variable will depend on whether the service is offered as a dedicated service or is incorporated as part of current shared services.

If the service is to be offered as a dedicated service, the increase in total hours and miles will equal the amount of hours and miles estimated to provide the requested services independently. If the service is to be incorporated into existing shared services, the increase in total mileage will be some fraction of the total miles to operate the service independently. You need to estimate the actual increase in total vehicle hours and total vehicle miles.

For example, it is proposed that our sample agency provide transportation services to Program X. The service requires transportation of an average of 4 passenger trips a day into a neighboring parish on every Tuesday and Thursday for 24 weeks.

If the service was offered as a dedicated service, it would require an estimated 192 hours (4 hours/day x 2 days/week x 24 weeks). The vehicle miles required are estimated at 6,912 miles (144 miles/day x 2 days/week x 24 weeks). Using these operating factors the incremental cost of the new service is calculated in exhibit 9.

Exhibit 9. Estimating the Incremental Cost of New Dedicated Service

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	192	\$ 9.7381	\$ 1,869.72
Miles	6,912	\$ 0.4558	\$ 3,150.45
			\$ 5,020.18 Incremental Cost

This estimate of \$5,020 is the additional costs you would incur for providing this service as a dedicated service under your current operations. It does not consider cost savings that could be gained from integrating the service into shared ride services and it does not include the burden of fixed costs.

If the service were offered as part of existing service, the increases in hours and miles would be some fraction of the amounts for dedicated service. Based on the transit manager's knowledge of current service and the proposed new service, it is estimated that the increase in hours would be 24 (0.5 hours/day x 2 days/week x 24 weeks). The increase in miles is estimated at 1,440 (30 miles/day x 2 days/week x 24 weeks). Using these operating factors, the incremental cost of the new service incorporated into existing service is calculated in exhibit 10.

Exhibit 10. Estimating the Incremental Cost of New Shared Service

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	24	\$ 9.7381	\$ 233.72
Miles	1,440	\$ 0.4558	\$ 656.34
			\$ 890.06 Incremental Cost

The incremental cost of service is the minimum our sample agency would need in order to recover the cost of service. Is this how much they should actually charge Program X for the proposed service?

- C. Pricing New Service**—How much to charge for new service? In the previous example, if you charged Program X only the incremental cost of providing service you would meet the objective of recovering your cost. However, there would appear to be an equity issue. Program X would not be paying its fair share of fixed cost. Exhibits 11 and 12 propose two costing alternatives that would allocate an appropriate share of fixed cost to Program X.

The first alternative calculates incremental cost of service to determine the variable cost to Program X then adds a portion of fixed cost based on the current overhead rate.

Exhibit 11. Alternative 1—Cost of New Service to Program X

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	24	\$ 9.7381	\$ 233.72
Miles	1,440	\$ 0.4558	\$ 656.34
			\$ 890.06 Variable Cost
Overhead Rate		34.01%	\$ 302.73 Fixed Cost
			\$ 1,192.79 Total Cost

The second alternative adds the incremental increases in vehicle hours and vehicle miles to the values for the existing service. The total cost of the revised service including Program X is then calculated. Finally, program X is allocated its share of the cost of service based on the percentage of total passenger trips incurred by Program X (exhibit 12).

For this example it was determined that current Tuesday/Thursday service to the neighboring parish averages 4.0 hours, 130 vehicle miles and 12 passenger trips per day. Exhibit 12 calculates the estimated total cost of service to Program X at \$3,004.

Exhibit 12. Alternative 2—Fully Allocated Cost of Program X

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	4.5	\$ 9.7381	\$ 43.82
Miles	160	\$ 0.4558	\$ 72.93
Overhead Rate		\$ 0.3401	\$ 116.75 Variable Cost
			\$ 39.71 Fixed Cost
			\$ 156.46 Total Cost per day

Total passenger trips per day: 12 existing service + 8 Program X
= 20 psgr trips per day

Cost per passenger trip:
\$156.47 total cost per day / 20 psgr. trips per day
= \$ 7.82 per psgr trip

Total psgr. trips for Program X for 24 weeks: 8/day x 2/days x 24 weeks
= 384 psgr trips

Total cost Program X: 384 psgr trips @ \$7.82 per trip

= **\$ 3,003.88**

This estimate includes both the appropriate burden of fixed costs and the appropriate cost benefit of being integrated into shared services. The estimated cost now meets both objectives of recovering total cost and cost equity among programs.

This cost allocation method is just the beginning point for pricing a contract service. Adjustments may be required based on the terms and conditions of the contract, but the initial costs estimates should come from your allocation model with all adjustments and assumptions documented as to the reason and the method of adjustment.

IV. CASE STUDY: SUNSHINE TRANSIT

Sunshine Transit is a local public transportation provider operated by a multi-purpose social service agency in Sunshine County. Sunshine transit currently operates two primary types of transit service, demand response and route deviation based on subscription service. The transit agency receives funding from numerous federal, state and local funding sources and provides service to six different programs and the general public.

Last fiscal year's operating statistics for the **total system** and for **three of the six programs** are provided in Table 1.1. Only the Youth Program is provided as a dedicated service. All other services are provided as part of a shared ride service.

Table 1.1. Sunshine Transit Operating Statistics for FY 96-97

	System Total	Nutrition Centers	Youth Program	Training Program	All Other Programs
Transportation Cost	\$176,270				
Vehicles	7	2-4	1	3-7	1-7
Vehicle Miles	88,904		3,600		30,853
Vehicle Hours	4,176		120		1,441
Passenger Trips	15,205	7,800	960	1,200	5,245
Passenger Miles	133,049	71,994	7,008	10,560	43,487
Hours of Operations	6:00 am to 6:00 pm	10:30-11:30am 2:00-3:00pm	7:30-9:00am 12:00-1:30pm	varies average 4 hrs/day	
Days of Operations	260/year	260/year	40/year	260/year	

Exercise 1.1. Develop Cost Allocation Model (Worksheets A and B)

Using the data in table 1.1, develop a cost allocation model for Sunshine Transit.

Step 1. Allocate total cost to appropriate model variable: vehicle hours, vehicle miles, and fixed cost (using allocation basis provided in example 1)

Step 2. Calculate unit cost: cost per hour, cost per mile and overhead rate.

Step 3. Insert unit cost into cost allocation table and cost allocation formula.

Exercise 1.2. Adjustments for Shared Ride Services (Worksheet C)

Using the data in table 1.1 calculate the adjusted vehicle hours and vehicle miles by program.

Exercise 1.3. Cost of current Service (Worksheet D)

Using the model developed in Exercise 1.1., calculate the cost of current service for each program.

Exercise 1.4. Cost of New Service—Dedicated Service (Worksheet E)

Sunshine Transit has been asked to expand services for the Training Program to include service to a neighboring county on Tuesday and Thursday of each week for 13 weeks. Sunshine Transit **does not** currently provide services into this county on a regular basis.

It is estimated that the new service will require 4 additional vehicle hours per day, 168 additional vehicle miles per day and will need to provide average of 8 passenger trips per day.

Calculate the cost of the new service if the service is offered as a dedicated service.

Exercise 1.5. Cost of New Service—Shared Service (Worksheet F)

Calculate the Training Program cost of the new service described in Exercise 1.4 if the service is offered as a **shared service**. Assuming that you expect an average trip demand from other programs of 2 passenger trips per day with no additional increase in vehicle miles or hours.

Exercise 1.6. Cost of Incremental Change in Service (Worksheet G)

Sunshine Transit currently provides service into the neighboring county every Wednesday. Average operating statistics for current service to the neighboring county is 4 vehicle hours, 178 vehicle miles and 16 trips per day.

Sunshine Transit has been asked to expand services for the Training Program to include service to a neighboring county on Wednesday of each week for 13 weeks. Sunshine Transit **does** currently provide shared services into this county every Wednesday.

It is estimated that the new service will require additional one-half a vehicle hour per day, 30 additional vehicle miles per day and will need to provide average of 8 passenger trips per day for the Training Program.

- a. Calculate the current cost of service for a **13 week period**.
- b. Calculate the incremental cost of the new service. If the Training Program were only charged for the **incremental cost**, what would the cost per passenger trip be?
- c. Calculate the total cost of current service for 13 weeks and the proposed new service.
- d. Calculate the cost of the proposed service for the Training Program if costs are allocated cost on a shared ride basis.

Appendix A

Case Study: Sunshine Transit Answer Key

Worksheet A. The Development of a Two Variable Cost Allocation Module

Case Study Sunshine Transit--Answer Key

Expense Account	Total Cost	Variable Cost		Fixed Cost
		Vehicle Hours	Vehicle Miles	
Vehicle Operations & Maintenance				
Labor				
Driver Salaries & Wages	42,048	42,048		
Dispatcher Salaries & Wages	5,738			5,738
Mechanic Salaries & Wages	-		-	
Fringe Benefits				
Driver Fringe	5,814	5,814		
Dispatcher's Fringe	954			954
Mechanic Fringe	-		-	
Contract Maintenance Services	8,754		8,754	
Materials & Supplies				
Fuel & Lubricants	8,975		8,975	
Tires and Tubes	1,044		1,044	
Other Parts & Supplies	2,207		2,207	
Vehicle Licensing & Registration Fees	225			225
Purchased Transportation	1,244		1,244	
Depreciation--Passenger Revenue Vehicles	30,000		30,000	
Depreciation--Maintenance Facilities	-			-
Insurance--Passenger Revenue Vehicles	12,352		12,352	
Leases & Rentals--Passenger Revenue Vehicles	-		-	
Lease or Rental for Maintenance Facilities	-			-
General Administrative				
Labor				
Transportation Manager's Salaries & Wages	18,000			18,000
Director's Salaries & Wages	5,865			5,865
Other Administrative Salaries & Wages	3,069			3,069
Fringe Benefits				
Transportation Manager's Fringe Benefits	5,400			5,400
Director's Fringe Benefits	1,760			1,760
Other Administrative Fringe Benefits	921			921
Professional & Technical Services	433			433
Materials & Supplies	2,010			2,010
Utilities	1,200			1,200
Insurance (Other Than Passenger Revenue Vehicles)	7,106			7,106
Depreciation on Buildings & Equipment	-			-
Miscellaneous Expenses				
Dues & Subscriptions	152			152
Travel & Meetings	1,500			1,500
Leases and Rentals				
General Administration Facilities	9,500			9,500
TOTAL COSTS	\$ 176,270	\$ 47,862	\$ 64,576	\$ 63,831
Annual Operating Statistics		4,176	88,904	
Unit Cost		\$ 11.4613 per hour	\$ 0.7264 per mile	
Overhead Rate (Total Fixed Cost as a % of Total Variable Cost)		56.77%		

Worksheet B. Cost Allocation Module--Sunshine Transit
Answer Key

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours		\$ 11.4613	\$ -
Miles		\$ 0.7264	\$ -
			\$ - Variable Cost
Overhead Rate		56.77%	\$ - Fixed Cost
			\$ - Total Cost

Allocation Formula: Total Cost of Service =
 $1.5677 \times (11.4613 \times \text{Hours} + 0.7264 \times \text{Miles})$

**Worksheet C. Allocation of Vehicle Hours and Miles Among Shared Services
Case Study Sunshine Transit--Answer Key**

	Total Vehicle Hours Entire System	Total Vehicle Hours All Dedicated Service	Total Vehicle Hours All Shared Services	Total Vehicle Miles Entire System	Total Vehicle Miles All Dedicated Service	Total Vehicle Miles All Shared Services
	4,176	120	4,056	88,904	3,600	85,304
Shared Services	Psgr. Miles	% Psgr Miles for all shared services				Vehicle Miles Allocated by %
Nutrition	71,994	57.12%	2,316.79			48,726
Training	10,560	8.38%	339.89			7,148
All Other Progs.	43,487	34.50%	1,399.32			29,430
Totals	126,041	100.00%	4,056.00			85,304

Worksheet D. Cost of Current Services--Sunshine Transit

Answer Key

Nutrition Center

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	2,316.79	11.4613	26,553.43
Miles	48,726	0.7264	35,392.62
Overhead Rate		56.77%	\$61,946.04 Variable Cost
			\$35,166.77 Fixed Cost
			\$97,112.81 Total Cost

Youth Program

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	120.00	11.4613	1,375.36
Miles	3,600	0.73	2,614.90
Overhead Rate		56.77%	\$3,990.25 Variable Cost
			\$2,265.27 Fixed Cost
			\$6,255.52 Total Cost

Training Program

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	339.89	11.4613	3,895.58
Miles	7,148	0.7264	5,192.02
Overhead Rate		56.77%	\$9,087.60 Variable Cost
			\$5,159.03 Fixed Cost
			\$14,246.63 Total Cost

Worksheet E. Cost of New Service--Sunshine Transit
Answer Key

Dedicated Service

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	104	\$ 11.4613	\$ 1,191.98
Miles	4,368	\$ 0.7264	\$ 3,172.74
Overhead Rate		56.77%	\$ 4,364.72 Variable Cost
			\$ 2,477.85 Fixed Cost
			\$ 6,842.56 Total Cost

Hours = 4hours/day X 2days/week X 13weeks = 104 hours

Miles = 168/miles/day X 2days/week X 13weeks = 4,368 miles

Worksheet F. Cost of New Service--Sunshine Transit
Answer Key

Shared Service

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	104	\$ 11.4613	\$ 1,191.98
Miles	4,368	\$ 0.7264	\$ 3,172.74
			\$ 4,364.72 Variable Cost
Overhead Rate		56.77%	\$ 2,477.85 Fixed Cost
			\$ 6,842.56 Total Cost

Estimated psgr trips Training Program:

$$8/\text{day} \times 2\text{days/week} \times 13/\text{weeks} = 208 \text{ psgr. trips}$$

Estimated psgr trips Other Programs:

$$2/\text{day} \times 2\text{days/week} \times 13/\text{weeks} = 52 \text{ psgr. trips}$$

Cost per passenger trip: total Cost/total passenger trips

$$\$6,842.35 / 260 = \$26.32 \text{ per psgr trip}$$

Total Cost for Training Program:

$$\$26.32/\text{psgr trip} \times 208 \text{ psgr trips} = \boxed{\$5,475}$$

Worksheet G. Incremental Cost of Change in Service
Sunshine Transit
Answer Key

Cost of Current Service
for 13 week period

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	52	\$ 11.4613	\$ 595.99
Miles	2,314	\$ 0.7264	\$ 1,680.80
			\$ 2,276.78 Variable Cost
Overhead Rate		56.77%	\$ 1,292.53 Fixed Cost
			\$ 3,569.32 Total Cost

total passenger trips:208 Cost per passenger trip: \$ 17.16

Incremental Cost of Proposed Service

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	6.5	\$ 11.4613	\$ 74.50
Miles	390	\$ 0.7264	\$ 283.28
			\$ 357.78 Incremental Cost

total passenger trips: 104 Cost per passenger trip: \$ 3.44

Worksheet H. Fully Allocated Cost of Change in Service
Sunshine Transit
Answer Key

Total Cost of Expanded Service
for 13 week period

	Model Inputs	Model Variables	Model Outputs
	Operating Statistics	Unit Cost	Total Cost
Hours	59	\$11.4613	\$ 670.49
Miles	2,704	\$ 0.7264	\$ 1,964.08
Overhead Rate		56.77%	<div>\$ 2,634.56 Variable Cost</div> <div>\$ 1,495.64 Fixed Cost</div> <div>\$ 4,130.21 Total Cost</div>

Estimated psgr trips Training Program:

8/day X 1days/week X13/weeks = 104 psgr. trips

Estimated psgr trips Existing Service:

16/day X1days/week X13/weeks = 208 psgr. trips

Cost per passenger trip: total Cost/total passenger trips

\$4,130.09 / 312 psgr trips = \$ 13.24

Total Cost for Training Program:

\$13.24/psgr trip X 104 psgr trips = **\$1,376.74**

Bibliography

- . 1997. *OMB Circular A-122 “Cost Principals for Non-Profit Organizations” (Revised 5/8/97 as Further Amended 8/29/97)*. Office of Management and Budget. Washington, D.C.
- . 1997. *OMB Circular A-87 “Cost Principals for State, Local and Indian Tribal Governments” (Revised 5/8/97 as Further Amended 8/29/97)*. Office of Management and Budget. Washington, D.C.
- Burkhardt, Jon E., Beth Hamby, Littleton C. MacDorman, Brian E. McCollom and Gordon A. Schreur. 1992. *Comprehensive Financial Management Guidelines for Rural and Small Urban Public Transportation Providers*. North Carolina Department of Public Transportation and Rail Division, North Carolina.
- Collura, John, Dale Cope, James Male, Paul W. Shuldiner, Japhet Nkonge, Ayodele Mabolorin and Lawrence Canner. 1982. *Apportioning the Costs of Rural Public Transportation among Participating Towns and Human Service Agencies*. Report number DOT-RSPA-DMA-50/82/2, U.S. Department of Transportation, Washington D.C.
- Collura, John and Dale Cope. 1982. *A Manual of Procedures to Apportion Costs of Rural Public Transportation Among Participating Towns and Human Service Agencies*. Report number DOT-RSPA-DMA-50/82/3, U.S. Department of Transportation, Washington D.C.
- COMSIS Corporation and McDorman & Associates. 1989. *Cost Allocation and Cost Estimation for Better Management*. Public Private Transportation Network. Silver Spring, Maryland.